

GROW YOUR PALS PROGRAM GUIDE



THE NATIONAL FFA MENTORING PROGRAM

Sponsored by



LESSON 1.5

Why Are Plants Green?

Unit:
PLANTS AND GARDENING

PRECEPTS

J. Mental Growth

- J1. Think critically
- J2. Think creatively



Lesson Type:
Large Group

NATIONAL STANDARDS

- PS.01.03.01.b. Explain requirements necessary for photosynthesis to occur and identify the products and byproducts of photosynthesis.
- PS.02.01.01.a. Describe the qualities of light that affect plant growth.
- NL-ENG.K-12.12 – Applying Language Skills
- NS.K-4.3 Life Science

STUDENT LEARNING OBJECTIVES

As a result of this lesson, the student will ...

- Explain the role of chlorophyll in a plant.
- Identify the elements needed for *photosynthesis* to occur in plants.
- Demonstrate the effect of light in the photosynthetic process through an experiment.





TIME

Instruction time for this lesson: **50 minutes.**



RESOURCES

National FFA Organization. (2003). LifeKnowledge Precepts and Signs of Success



TOOLS, EQUIPMENT AND SUPPLIES

- ✓ PALS1.5.LG AS.A- one per student.
- ✓ PALS1.5.LG AS.B- one for instructor
- ✓ PALS1.5.LG.ASSESS.A- one per student
- ✓ **One potted bean plant with four to six leaves for each student. (Or substitute geraniums or some other broadleaf plant)**
- ✓ **Green, blue and yellow crayons or colored pencils for each student**
- ✓ **Two, one-inch square pieces of black construction paper for each student**
- ✓ **Two paper clips for each student**
- ✓ **Room where plants can receive light**
- ✓ **Writing surface and markers**

KEY TERMS



The following terms are presented in this lesson and appear in ***bold italics***:

Photosynthesis

Chlorophyll

Glucose



CONTENT OUTLINE

- I. Why Plants Are Green
 - A. Handout PALS1.5.LG.AS.A and cover information on top half of handout
 - B. Students will retrieve needed colors
- II. Plants produce their own food in the form of sugar
 - A. Chlorophyll combines with water and light to make plant food in the form of sugar or through a process called *photosynthesis*
- III. Prepare plants for light experiment
 - A. Use paper clips to place two black squares of construction paper on the top and bottom side of bean leaf
 - B. Place bean plants where they will receive light
 - C. Leave for at least one week and then compare covered leaf to leaves receiving full light

INTEREST APPROACH

Students will observe a potted plant and try to answer why the stems and leaves are green.



Have you ever wondered why plants like this have green leaves and stems? Why not white, blue or pink? Can anyone guess why most plants are green?

Hold up plant for observation. Pause and allow students time to think and respond.



There is a special element that gives this plant its green color. We will soon find out what it is.

SUMMARY OF CONTENT AND TEACHING STRATEGIES

OBJECTIVE 1: | Explain the role of *chlorophyll* in plants.



After students have responded with guesses about why plants are green, provide students with PALS1.5.LG.AS.A. Address information on handout with students and instruct them to color characters on the handout.

I. *Why plants are green*

- A. Handout PALS1.5.LG.ASA and address information on top half of handout.
- B. Students will retrieve needed colors.

Distribute a copy of PALS1.5.LG.AS.A to each student.



There is a special element that gives plants their green color. Pull out this paper, “Meet ***Chlorophyll***.”

Hold up copy of PALS1.5.LG.AS.A so students can see the paper you are referring to.



See the round little character on the front? His name is ***Chlorophyll***, but we will call him Chloro for short. What color is Chloro? Green, correct! When light hits Chloro, he reflects green color making plants green.



Chloro tells us he has been out of the light and is missing his green color. We need to help him get it back. When you hear the word GREEN take out your colors and find the green color. If you do not have green, raise your hand. What questions are there?

GREEN!

Check to see that all students have a green color.



It looks like everyone has a green color. When you hear the word COLOR, take your green color and color the face and hands of Chloro. You will notice that Chloro is in two places on the sheet. Color both pictures of Chloro. What color are we going to use? Green, that’s right!

COLOR!

Allow students to color Chloro. When they are finished, instruct them to lay their colors down.



It looks like most of you are close to finishing. When you have completed coloring both images of Chloro, lay your color down and listen for the next step.

OBJECTIVE 2: | Identify the elements needed for *photosynthesis* to occur in plants.



II. *Plants produce their own food in the form of sugar.*

B. ***Chlorophyll*** combines with water and light to make plant food in the form of sugar or ***glucose*** through a process called ***photosynthesis***

Point to the second half of the sheet so all students can see. Point to each element of ***photosynthesis*** as you explain the process.



We have learned that ***chlorophyll*** makes plants green. But Chloro does more than give plants their green color. He makes food for plants so they can grow. Let's find out how.

When it rains and the sun shines, something special happens in a plant. The ***chlorophyll*** plus water and light combine to make sugar. Sugar is food for plants and it makes them grow. This process is called ***photosynthesis***.

Use a Chorale Response e-Moment® to help students pronounce ***photosynthesis***. Sound out the three main parts for the students, Photo - Syn-thesis. Students will then repeat each part back to you and finally repeat the complete word.



Photosynthesis is a really big word. Let's see if we can say it together. First we will say PHOTO. On the count of three, let's say it. One, two, three –

PHOTO



Great! Now the second part, SYN. One, two, three –

SYN

Now the last part, THESIS. One, two, three,

THESIS



Put the three parts together. One, two, three –

PHOTOSYNTHESIS



Good job!

Can you eat lots of sugar and grow like plants?

Wait for student responses, some may say no, others, yes.



Sugar can make some food taste good, like cookies, but too much sugar will make you sick.

Here is a question for you: Since plants use sugar as food, could you sprinkle sugar on plants and make them grow?

Wait for student responses.



Wow, way to think! Here is the correct answer.

The sugar **chlorophyll** makes is not like the white sugar you might have in your kitchen. It is a liquid form of sugar that plants can use called **glucose**. So you can't sprinkle white sugar on your plants and make them grow. It has to be a special sugar like Chloro makes.

Let's add some color to the elements Chloro will use to make sugar. When you hear the word SUGAR find a blue color and a yellow color. Use the blue color to color the raindrops and yellow to color the sun. Hold both colors in the air. Great!

SUGAR

Observe students as they finish coloring their papers. As they are finishing, instruct them to lay their colors down and prepare to learn about an experiment.



When you finish coloring, put your colors away. When everyone is finished, we will create an experiment with **chlorophyll** and light.

OBJECTIVE 3: | Demonstrate the effect of light in the *photosynthetic* process through an experiment.



III. *Prepare plants for light experiment.*

- A. Use paper clips to place two black squares of construction paper on the top and bottom side of bean leaf
- B. Place bean plants where they will receive light
- C. Leave for at least one week and then compare covered leaf to leaves receiving full light

Provide one bean plant (or other suitable broadleaf plant) to each student. Each student will also need two, one-inch square pieces of black construction paper and two paper clips. Do not hand out items for experiment until after you have demonstrated how to clip construction paper to top and bottom side of one leaf on the plants. Once students have completed covering leaf, place plants in area they will receive light. Sun is preferable but artificial light will also work.



In a moment, we will gather the items needed for this experiment. Before that, let's see how to set up the experiment.

To create our experiment with **chlorophyll** and light, we will cover one leaf of a plant with black construction paper. This will block the light from getting to the **chlorophyll** in that leaf. Watch carefully how to attach the paper to the leaf.

First take two pieces of black construction paper. Put one piece on the top side of the leaf and the second piece on the bottom side of the leaf. Hold the paper in place with one hand. Pick up one of the paper clips and slide it over the two pieces of paper. Repeat this on the other side of the leaf so you have a paper clip on two different edges. What questions do you have?

Give each student two pieces of construction paper and two paper clips. Instruct students to come to the front of the room and pick up one plant.



When you hear the phrase GET THE PLANTS quietly come to the front of the room and pick up one plant then return to your seat. I will give you the paper clips and paper as soon as you are seated. Once all of your supplies are together, clip the paper to the leaves like we learned.

GET THE PLANTS

Observe students as they clip the paper to the leaves. Some may need assistance.



Raise your hand if you need help clipping the paper to the leaves.

Now that we have the papers clipped to the leaves, let's put them in the window for one week. Next week, we will see if there is any change to the covered leaf. Please take your plants to the window at this time then return to your seat.



You did an excellent job. Thank you for being careful with the plants.



REVIEW / SUMMARY

*Use a Karaoke e-Moment® to help students review the terms and processes learned. The **Photosynthesis** Song is sung to the tune of Row, Row, Row Your Boat. Using PALS1.5.LG. AS.B, copy the song onto a writing surface large enough for all students to see. Demonstrate the song for the students.*



To help us remember what we have learned about **chlorophyll** and **photosynthesis**, we are going to sing the **Photosynthesis** Song. It goes like this:

Photo-syn-thesis,
Keeps our plants so green,
Rain, sun and **chlorophyll** make the food plants need.



So let's try this together. (*Sing each line separately then put them all together*)

The first line is **Photosynthesis**. Sing it with me. Photo-syn-thesis.
The second line is: Keeps our plants so green. Now your turn – Keeps our plants so green.

The third line is: Rain, sun and **chlorophyll** make the food plants need. Now you sing it. "Rain sun and **chlorophyll** make the food plants need."

OK. All together now. (*Slowly*)

Photo-syn-thesis,
Keeps our plants so green,
Rain, sun and **chlorophyll** make the food plants need.

Sing the song several times. For added fun, split class into three groups and sing in rounds.



APPLICATION

One-on-One Idea

Encourage students to look around the outside of their homes for signs of plants that have not received enough sun and are pale green or yellow. Examples would be plants that may have been covered with leaves or grass that has had a hose or some other item laying on it for several days. Ask them to report their finding to you.

Continued Discussion

After the plants have had their leaf covered for a week, remove the paper and discuss the differences students see. Leaves that were covered should be lighter green or yellow.



Look at the leaves that were covered. What is different about them compared to the other leaves on the plant?



Why do you think the leaves are pale or yellow?

*Explain that since they received no light, **chlorophyll** did not have the energy to create **photosynthesis** so the plant lost its green color.*



If the leaves turn pale, does this help or hurt the plant? *Wait for student response. Some may say “help” and some may say “hurt” be prepared for follow up questions such as:*



What process helps the plant turn green? Hint, remember our song? *Wait for students to respond with “**photosynthesis**.” When the plant is green, **photosynthesis** is taking place and food is produced for plant to grow.)*

If **photosynthesis** is not taking place, will the plant have food? *(Wait for students to respond.)* What effects would this have on the plant?



EVALUATION

See PALS1.5.LG ASSESS.A at end of this lesson

ANSWERS TO EVALUATION:

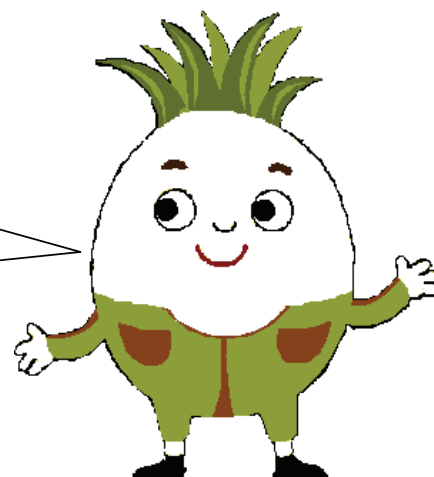
1. Lines should be drawn from Chlorophyll, water and sun. (Exact order does not matter)
2. Chlorophyll should be circled.

PALS1.5.LG.AS.A

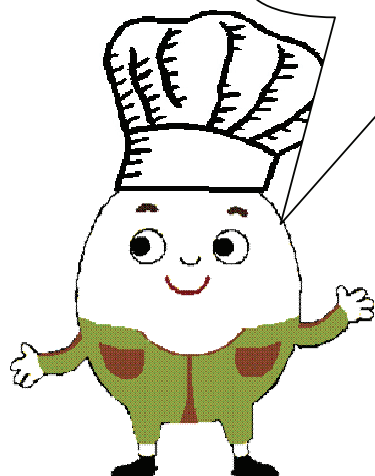
Meet Chlorophyll

Hi! I'm Chlorophyll. But you can call me Chloro. I live in plants and make them green. I also use light and water to help make food for the plants.

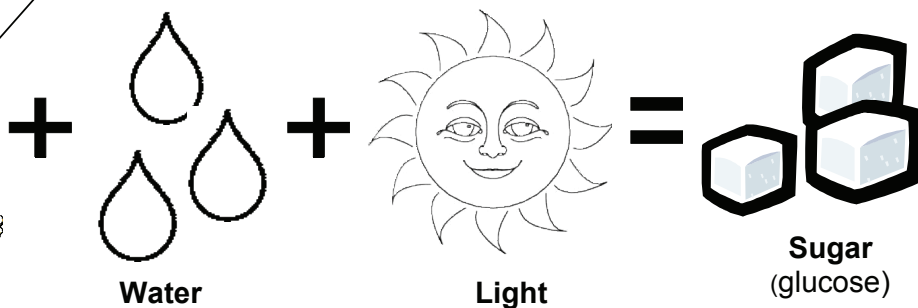
I have been out of the sunlight and I'm missing my green color. Color me green where I am white.



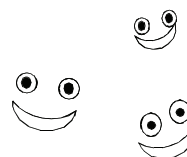
When it rains and the sun shines on me, I make food for the plant in the form of sugar. This is called **photosynthesis**.



Chlorophyll



Photosynthesis makes a happy and healthy plant!





PALS1.5.LG.AS.B

The Photosynthesis Song

(Sung to Row, Row, Row Your Boat)

Photo-syn-thesis,

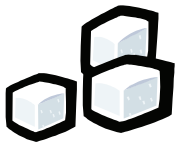
Keeps our plants so green,

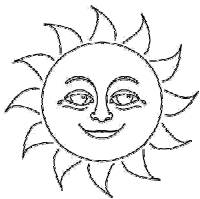
Rain, sun and chlorophyll make the food plants need.

PALS1.5.LG ASSESS.A

1. Match the elements needed for the Photosynthesis recipe by drawing lines from the correct picture to the correct blanks in the recipe. (Hint: One of the pictures does not belong)

Photosynthesis Recipe

$$\underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}} = \text{Sugar (glucose)}$$




Light



Chlorophyll

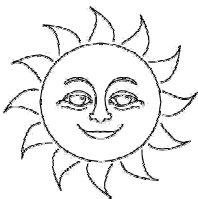


Fruit



Water

2. Circle the correct element which gives plants their green color.



Light



Chlorophyll



Water